The Impact of Minimum Wage Increases on Single Mothers

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Executive Summary

Advocates of federal and state minimum wage increases often cite poor single mothers as a target population for minimum wage protection. However, the empirical evidence shows that most minimum wage workers are neither single mothers nor poor. In fact, poor single mothers comprise less than 5 percent of all minimum wage workers, and almost 55 percent already earn wage rates greater than $7.25 per hour, the new higher federal minimum wage rate. Thus, most single mothers are unlikely to be affected by minimum wage policies. However, the minimum wage may have important effects on a subset of single mothers: those that are lower-skilled and less-educated.

In this study, Dr. Joseph J. Sabia of the University of Georgia uses data from a pooled cross-section of unmarried mothers from the March 1990 to March 2005 Current Population Survey (CPS) to examine the effect of minimum wage increases on single mothers' employment, hours worked, weeks worked, wages, wage income, welfare receipt, and poverty. As expected, the author finds that more highly educated single mothers—those with some post-high school education—are not affected by minimum wage increases because their skills command a wage premium higher than state or federal minimum wage levels. However, less-educated single mothers, who are more likely to earn lower wages than their higher-skilled counterparts, are adversely affected by mandated wage policies.

While minimum wage increases do raise the wage rates of employed less-educated single mothers, the evidence consistently shows that there are adverse employment and hours effects that undermine these wage gains. For single mothers without a high school diploma, a 10 percent increase in the minimum wage is associated with a 6.0 percent reduction in employment, an 8.5 percent reduction in steady work (1,040 annual hours), and a 14.5 percent reduction in full-time work (1,820 annual hours).

Additionally, a 10 percent increase in the minimum wage leads to a 7.9 percent reduction in usual weekly hours worked, an 8.3 percent reduction in annual weeks worked, and a 9.9 percent reduction in annual hours worked for single mothers without a high school diploma. In sum, despite increased wage rates among single mothers who keep their jobs, the reduction in employment and hours causes an 8.8 percent reduction in net income. When combined with slightly more educated single mothers (those with a high school diploma), the results are only slightly less severe. For example, a 10 percent increase in the minimum wage is associated with a 2.9 percent reduction in employment for single mothers with a high school degree or less.

The author also finds that minimum wage hikes have no significant impact (either positive or negative) on the poverty rates of single mothers of any education level. Additionally, higher minimum wages appear to actually increase the amount of welfare use by single mothers. For less-educated single mothers, a 10 percent increase in the minimum wage is associated with an approximately 8 percent increase in welfare receipt. While this effect is imprecisely estimated and bears further examination, it is consistent with earlier research.

In contrast, a far more effective pro-work strategy would be to expand the federal Earned Income Tax Credit (EITC) and/or its state supplements. The author finds that a 10 percent increase in the state EITC refundable credit is associated with a 1.0 to 1.5 percent increase in employment for single mothers, while simultaneously increasing hours and weeks worked as well. Most working poor households—especially single mother and African American households—would benefit from the EITC, while only a small minority would gain from a minimum wage hike. And because EITC costs are not borne by employers, there will be no reduction in demand for low-skilled workers, as is the case with a minimum wage increase.

Taken together, the 1990s and early 2000s saw important economic changes for single mothers. Employment rates, work hours, and wage income rose, while poverty rates and welfare use declined. The evidence presented in this study suggests that while pro-work welfare reforms, a growing macro-economy, and expansions in the Earned Income Tax Credit program may have each played a role in these positive economic trends, increases in the minimum wage did not. Rather, this study finds that minimum wage increases reduced less-educated single mothers' employment, hours worked, and wage income, while failing to alleviate poverty. The results of this study should serve as a caution to policymakers who view minimum wage hikes as a way to help single mothers.

—**Jill Jenkins**
Chief Economist

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Introduction

Policymakers advocating federal and state minimum wage increases often cite single mothers as an important target population for minimum wage protection. In a July 2006 press release, Senator Hillary Rodham Clinton argued:

> "It is unacceptable that Americans working full time are living in poverty. Every day the minimum wage is not increased, it continues to lose value and working families fall further behind. It is past time to stand up for working families and raise the minimum wage…A single mother with two children who works 40 hours a week, 52 weeks a year earns just $10,700 per year – almost $6,000 below the federal poverty line for a family of three." (Clinton, 2006)

One of the leading proponents of a federal minimum wage increase, Senator John F. Kerry (D-MA), made similar comments during his 2004 presidential campaign,[1] as did Senator Edward M. Kennedy in 2005:

> "[T]he jobs available to women leaving welfare are often minimum wage jobs, and it is difficult, if not impossible, for them to meet the needs of their families and raise their children. Daily life is often harsh for low-income working mothers in all parts of the country, whether or not they have been on welfare. For them, survival is the daily goal. If they work hard enough and their working hours are long enough, they can make ends meet – but only barely….We must stop asking these families to do it all alone. They are working too many hours for too little pay, without access to the support they need to make ends meet and improve the quality of their lives. One of the most important steps we can take is to guarantee a fair minimum wage." (Kennedy, 2005)

While the political rhetoric surrounding minimum wage hikes often centers on single mothers, the empirical evidence suggests that most minimum wage workers are neither single mothers nor poor. Less than 5 percent of minimum wage workers are poor single mothers (Burkhauser and Sabia, 2007). Moreover, among poor single mothers, almost 55 percent already earn wage rates greater than $7.25 per hour and would not directly benefit from the current federal minimum wage proposal.[2] As Burkhauser and Sabia (2007) show, most beneficiaries of a federal increase are second or third earners in households with incomes that are greater than two or three times the federal poverty line.

Despite the evidence that a small minority of poor single mothers are helped by minimum wage increases, the political rhetoric surrounding wage hikes continues to center on the policy goal of helping single mothers to escape poverty, particularly since the passage of the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) of 1996, which provided strong incentives for single mothers to increase labor supply and leave (or remain off of) the welfare rolls. The purpose of the current study will be to examine the employment, hours, and income effects of minimum wage increases on low-skilled single mothers.

Using data from a pooled cross-section of unmarried mothers from the March 1990 to March 2005 Current Population Survey (CPS), this study examines the effect of minimum wage increases on single mothers' employment, hours worked, weeks worked, wages, wage income, welfare receipt, and poverty. The evidence consistently shows that single mothers without a high school diploma are adversely affected by minimum wage increases. For these low-skilled single mothers, a 10 percent increase in the minimum wage is associated with a 6.0 percent reduction in employment, a 7.9 percent reduction in usual hours worked, an 8.3 percent reduction in annual weeks worked, and a 9.9 percent reduction in annual hours worked. Falsification tests show that there are no adverse employment or hours effects for post-high school educated single mothers, a more highly skilled population for which we would not expect a significant effect from minimum wage increases, lending credibility to the identification strategy employed.

The adverse employment and hours effects for less-educated single mothers translate into important wage income effects. While minimum wage increases do increase wages for employed less-educated single mothers (estimated wage elasticity ≈ 0.7), the adverse employment and hours effects result in a net income loss for this population. A 10 percent increase in the minimum wage is associated with an 8.8 percent reduction in wage income for single mothers without a high school degree. Finally, consistent with Page et al. (2005), the evidence shows that minimum wage increases are associated with an increase in welfare receipt, especially for single mothers with young children, though this effect is imprecisely estimated. Taken together, the evidence in this study suggests that minimum wage increases have important adverse economic consequences for less-skilled single mothers.

Literature Review

Standard neoclassical economic theory suggests that in the presence of competitive labor markets, increases in the minimum wage will reduce the demand for low-skilled labor, resulting in a reduction in employment and hours worked.[3] Much of the literature examining the employment effects of minimum wage hikes has focused on populations of low-skilled workers, usually teenagers and high school dropouts, because these are the populations most likely to be affected by minimum wage increases. Neumark and Wascher (2007) review over 90 empirical articles on the employment effects of the minimum wage and conclude that the evidence is "overwhelming" that the least-skilled workers most likely to be adversely affected by minimum wages experience the strongest disemployment effects (see, for example, Campolieti et al., 2006; Campolieti et al., 2005; Burkhauser, Couch, and Wittenburg, 2000a; Deere, Murphy, and Welch, 1995; Neumark, 2001; Neumark and Wascher, 1992, 2002; Neumark et al., 2004; Partridge and Partridge, 1999; Currie and Fallick, 1996; Williams, 1993; Couch and Wittenburg, 2001; Sabia, 2006). In this context, it is fair to categorize the positive employment effects found in some studies (see Card and Krueger, 1994; Card and Krueger, 1995) as outliers.[4]

Few studies in the minimum wage literature have examined the effect of minimum wage increases on single mothers. One reason for this is the considerable heterogeneity in skill level among this population. Only recently has some attention been paid to the effects of minimum wage increases on single mothers, with much of the focus on welfare receipt.[5] A provocative recent paper by Page et al. (2005) finds that a 10 percent increase in the minimum wage is associated with a 1 to 2 percent increase in welfare caseloads, which suggests that there may be important employment effects for this population. The current study builds on the Page et al. (2005) paper by examining whether minimum wage increases affect employment and hours worked for a population prone to welfare use.

While not examining the effect of minimum wage increases on single mothers' employment, Burkhauser and Sabia (2007) use CPS data to estimate the effect of minimum wage increases on single mothers' poverty. Burkhauser and Sabia (2007) find no evidence that increases in the minimum wage affect the poverty rates of single mothers, and conclude that poor target efficiency is a likely explanation for this finding. However, the authors do not empirically examine another path through which minimum wages could affect poverty: adverse employment effects.

Recent dynamic analyses that have examined the effect of minimum wage hikes on household-specific flows into and out of poverty (Neumark and Wascher, 2001, 2002; Neumark et al., 2005) have found that while some low-skilled workers who remain employed after a minimum wage hike are moved out of poverty, other low-skilled workers are moved into poverty as a result of adverse employment or hours effects. Neumark and Wascher (2002) conclude that the net effect resembles income redistribution among low-income families, leaving many worse off. Golan et al. (2001) also find evidence of adverse distributional effects, while Gundersen and Ziliak (2004) find essentially no relationship between minimum wage hikes and poverty.

Three studies by Grogger (2002; 2003; 2004) on the effects of time limits on single mothers' labor supply and welfare use include the minimum wage as a control variable in some regressions. In welfare models, Grogger finds some evidence that higher minimum wages may be associated with greater welfare use among those with younger children. The sign on the minimum wage coefficient in employment equations is negative, but is insignificant in most specifications.[6]

The current study contributes to the minimum wage literature in two important ways. First, while most studies in the literature have examined the effect of minimum wage increases on teenagers and younger high school dropouts, this study is one of the first in the literature to focus on lower-skilled single mothers, a vulnerable population targeted by state and federal policymakers for minimum wage protection. Using data from the Current Population Survey, this study presents estimates of the effect of minimum wage increases on a wide set of economic outcomes: employment, work hours, wages, wage income, welfare use, and poverty. Second, this study builds upon the work of Neumark (2007) by examining the effects of minimum wage increases in a period covering both the pre- and post-PRWORA years, which saw a large increase in employment rates among single mothers, a macroeconomic recession, and a large increase in the frequency and magnitude of state minimum wage increases.

Methodology

Following much of the existing minimum wage literature (see, for example, Card and Krueger, 1995; Sabia, 2006), and building

on the models estimated by Page et al. (2005) and Grogger (2002; 2003; 2004), the following fixed effects specification is used to estimate the effect of minimum wage increases on employment:

1 $\quad E_{ist} = \beta MW_{st} + X_{st}\delta + P_{st}\pi + Z_i\gamma + \varepsilon_{ist}$

here E_{ist} is an indicator variable measuring employment of person i in state s at time t, MW_{st} is the natural log of the higher of the real state or federal minimum wage in time period t, X_{st} is a set of state and year-specific economic controls, P_{st} is a set of state and year-specific policy variables, and Z_i is a set of individual characteristics. The unobserved determinants of employment can be decomposed as follows:

2 $\quad \varepsilon_{ist} = \alpha_s + \tau_t + f_s(t) + \upsilon_{ist}$

where α_s is a time-invariant state effect, which controls for fixed unmeasured characteristics of states, τ_t is a state-invariant time effect, which control for time trends common to all states, $f_s(t)$ is a state-specific time trend, which controls for unmeasured within-state trends over time, and υ_{ist} is the error term. The fixed effects are included to ameliorate bias in the estimate of β that may result from the endogeneity of state minimum wage laws. The model described above in (1) and (2) is also used to estimate the effect of minimum wage increases on several other outcomes: usual weekly hours worked, usual weeks worked per year, annual hours worked, steady employment, full-time employment, wage income, poverty, and welfare receipt.

Identification of minimum wage effects come from variation in minimum wages around a state-specific trend. Page et al. (2005) persuasively argue that the inclusion of state-specific time trends is critical in examining welfare (and employment) trends for single mothers, especially for samples spanning the pre- and post-welfare reform periods. There are several important reasons for this. First, the real value of the minimum wage tends to trend downward over time and increase abruptly with the passage of a minimum wage hike. Second, states adopting higher minimum wages may be trending differently than states that do not adopt higher minimum wages. Minimum wage hikes may be more likely to be adopted when expected employment trends are favorable. When the labor market is tight or a recession is anticipated, legislatures may be less willing to enact minimum wage hikes that could further exacerbate unemployment among low-skilled workers. Page et al. (2005) show that failure to adequately control for state-specific time trends in estimating the effect of minimum wage increases on welfare use can lead to biased estimates.[7] The authors examine state-specific residuals in regressions that omit state-specific time trends, and provide some descriptive

evidence of this. In fact, they conclude that using linear state-specific time trends may be insufficient to capture important forms of unmeasured heterogeneity in samples including the pre-and post-PRWORA period. This may be due to unmeasured trends in state-specific business cycles or in implementation of federal welfare reforms. Thus, the inclusion of non-linear state-specific time trends is appropriate. In our specification, we define $f_s(t) = \alpha_s t + \alpha_s t^2$, which permits a state-specific quadratic time trend.[8]

While the above specification controls for several forms of unmeasured heterogeneity to address the endogeneity of minimum wage laws, this comes at a cost of reduced precision. For example, year effects eliminate a potentially important identification source: federal variation in the minimum wage (see Burkhauser et al., 2000a for a discussion of this issue). Moreover, the inclusion of state-specific time trends requires estimated employment effects to come off of deviation from trend, which may eliminate some of the state-specific variation in minimum wages.[9] However, given the evidence in Page et al. (2005), as well as our own analysis of the CPS data, the benefit of reducing heterogeneity bias appears to outweigh the costs of lost precision. All regression models are estimated via weighted least squares with robust standard errors clustered at the state level.[10]

Dataset

The analysis uses pooled cross-sectional data from the 1990 to 2005 March Current Population Survey (CPS). Questions about employment, work hours, poverty, and welfare receipt are asked with reference to the previous year; thus, these data correspond to the calendar years 1989-2004. While the unit of observation is the individual, the estimate of β in equation (1) can be interpreted as the estimated effect of state minimum wage increases on predicted employment rates (or average hours worked).

One limitation of these data is that the use of pooled cross-sections may introduce measurement error, as discussed by Page et al. (2005). If there are small numbers of state and year-specific observations on single mothers, this can introduce measurement error. If the measurement error is random, then the estimate of β will be unbiased, but inefficient. This is because states with smaller numbers of single mothers sampled are likely to have greater within-state variation in employment rates over time.[11]

The weighted means and standard deviations of the key dependent and independent variables are found in Table 1. To be included in the sample, an individual must be a single female head of household aged 15-55 with children under 18 living in the family. The key outcomes examined are employment, usual hours worked, usual weeks worked, annual hours worked, steady employment, full-time employment, wage income, welfare receipt, and poverty.

	All	≤ HS Educ	< HS Educ	> HS Educ	Employed
Table 1					
Weighted Means and Standard Deviations of Variables					
Employment	0.777	0.703	0.552	0.880	---
	(0.416)	(0.457)	(0.497)	(0.325)	
Usual Weekly Hours Worked	29.5	26.2	19.8	34.2	38.0
	(18.0)	(18.9)	(19.4)	(15.6)	(9.75)
Usual Weeks Worked Per Year	34.6	30.1	21.7	40.9	44.6
	(22.1)	(23.3)	(23.2)	(18.7)	(13.7)
Annual Hours Worked Per Year	1,346.0	1,149.7	799.4	1,617.9	1,731.9
	(952.9)	(965.4)	(920.3)	(864.7)	(707.1)
Steady Employment (≥ 1,040 Hours)	0.642	0.551	0.380	0.767	0.826
	(0.480)	(0.497)	(0.486)	(0.423)	(0.379)
Full-Time Employment (≥ 1,820 Hours)	0.496	0.411	0.260	0.615	0.639
	(0.500)	(0.492)	(0.439)	(0.487)	(0.480)
Annual Wage Income (in $)	13,155.3	8,693.5	4,873.6	19,335.5	16,927.6
	(18841.8)	(13090.6)	(10318.2)	(23316.0)	(19823.2)
Poverty (< 100% of Federal Poverty Line)	0.363	0.478	0.637	0.203	0.247
	(0.481)	(0.500)	(0.481)	(0.403)	(0.431)
Welfare Receipt	0.220	0.292	0.412	0.120	0.122
	(0.414)	(0.455)	(0.492)	(0.325)	(0.328)
Log (Minimum Wage)	1.55	1.53	1.53	1.56	1.55
	(0.149)	(0.151)	(0.154)	(0.146)	(0.149)
Log (Max EITC Benefit)	7.57	7.54	7.54	7.62	7.59
	(0.604)	(0.631)	(0.643)	(0.560)	(0.592)
Work Requirement	0.588	0.553	0.542	0.636	0.616
	(0.477)	(0.583)	(0.483)	(0.465)	(0.472)
Time Limit	0.538	0.504	0.485	0.586	0.568
	(0.495)	(0.497)	(0.497)	(0.489)	(0.492)

Table 1 (Continued)

Weighted Means and Standard Deviations of Variables

	All	≤ HS Educ	< HS Educ	> HS Educ	Employed
Family Cap	0.317	0.296	0.303	0.347	0.332
	(0.460)	(0.451)	(0.454)	(0.470)	(0.465)
Paternity Enforcement	0.533	0.499	0.482	0.581	0.563
	(0.496)	(0.497)	(0.497)	(0.490)	(0.493)
Log (Max AFDC-FS3 Benefit)	6.32	6.30	6.31	6.35	6.32
	(0.253)	(0.259)	(0.267)	(0.243)	(0.252)
Less than HS Education	0.214	0.368	---	---	0.152
	(0.410)	(0.482)			(0.359)
Some College (< 4 Years College)	0.302	---	---	0.720	0.330
	(0.459)			(0.449)	(0.471)
College	0.084	---	---	0.200	0.101
	(0.277)			(0.400)	(0.301)
Post-College	0.033	---	---	0.080	0.041
	(0.180)			(0.271)	(0.199)
Disability	0.087	0.105	0.142	0.062	0.039
	(0.282)	(0.307)	(0.349)	(0.241)	(0.194)
Child < 6 years	0.373	0.408	0.436	0.324	0.339
	(0.484)	(0.491)	(0.496)	(0.468)	(0.473)
Number of Children	1.84	1.97	2.21	1.66	1.74
	(1.04)	(1.14)	(1.29)	(0.866)	(0.939)
Age	35.3	34.3	33.9	36.7	35.7
	(8.73)	(9.03)	(9.81)	(8.10)	(8.47)
Black	0.335	0.364	0.366	0.296	0.315
	(0.472)	(0.481)	(0.482)	(0.456)	(0.465)
Non-MSA	0.177	0.190	0.176	0.161	0.179
	(0.382)	(0.392)	(0.381)	(0.367)	(0.383)
State Unemployment Rate (Males Aged 25-54)	0.087	0.087	0.089	0.087	0.087
	(0.025)	(0.026)	(0.025)	(0.025)	(0.025)

Table 1 (Continued)					
Weighted Means and Standard Deviations of Variables					
	All	≤ HS Educ	< HS Educ	> HS Educ	Employed
Log (State Mean Wage), (All Aged 25-54)	3.06	3.04	3.03	3.10	3.08
	(0.343)	(0.347)	(0.343)	(0.333)	(0.342)
Log (State GDP)	12.23	12.21	12.33	12.26	12.22
	(0.999)	(0.989)	(1.00)	(1.01)	(1.00)
N	76,034	43,840	16,370	32,194	58,972

Source: Computed by the author.
Data: March 1990 to March 2005 Current Population Survey. Sample limited to unmarried mothers aged 15-55.

Key Dependent Variables

Employment, Hours, and Weeks Worked

A single mother is defined as being employed if she reports working positive hours in the last year. While 77.7 percent of all single mothers reported at least one hour of work in the previous year, employment rates differ substantially by educational attainment. Only 55.2 percent of single mothers without high school diplomas were employed, while 88.0 percent of single mothers with some post-high school education reported work. Figure 1A shows national trends in single mothers' employment, by educational status, from 1989 to 2004. These trends show that employment rates for single mothers were steady or slightly declining from 1989-1993, then grew dramatically from 1993 to 2000, and then began falling slightly from 2001-2004. The large increase in labor force participation of single mothers in the mid and late 1990s was driven, in large part, by the increase in work for those without a high school diploma. However, single mothers with at least some college education follow a similar employment trend. Given that this higher skilled group of single mothers is not expected to be affected by minimum wage increases, they will serve as a credible "control" group for a series of falsification tests.

Differences in employment rates by educational attainment contribute, in part, to differences in usual weekly hours worked, usual weeks worked per year, and annual hours worked per year. Single mothers without a high school diploma worked, on average, 19.8 hours per week, 21.7 weeks per year, and 799.4 hours per year. Unmarried mothers with some post-high school education worked much more, with a mean of 34.2 hours per week, 40.9 weeks per year, and 1,617.9 hours
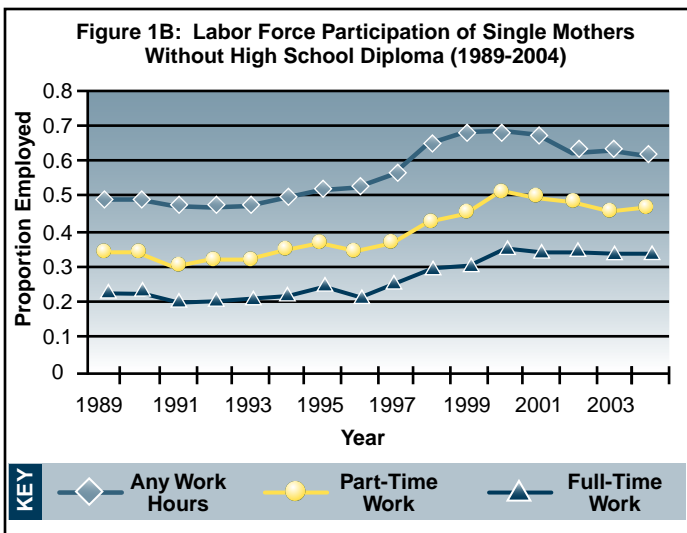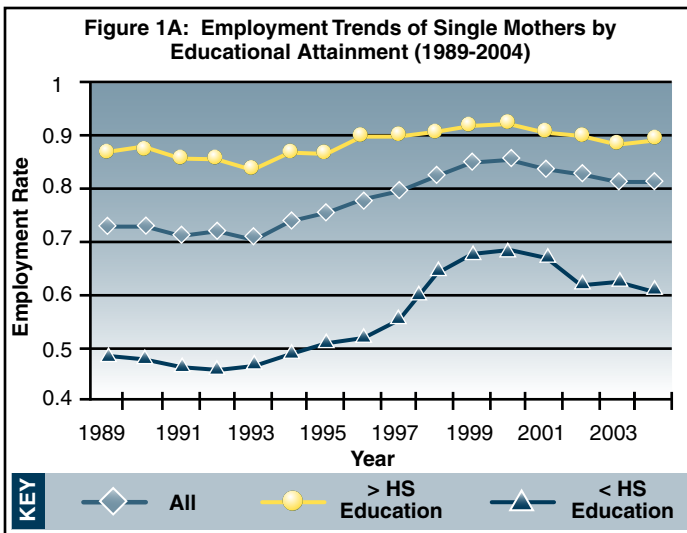
per year. Conditional on employment, single mothers were employed for an average of 38.0 hours per week and 44.6 weeks per year.

Using information on hours and weeks worked, two additional common employment measures are constructed: steady employment and full-time employment. A single mother is defined as being steadily employed if she reports working at least 1,040 hours in the last year, which suggests an average of 20 hours per week throughout the year. 64.2 percent of all single mothers and 38.0 percent of unmarried mothers without a high school diploma reported working steadily. Full-time employment is defined as working at least 1,820 hours in the last year, which corresponds to an average of 35 hours per week throughout the year. 50 percent of all single mothers and 26 percent of single mothers with less than a high school education reported working full-time last year.

Figure 1B shows steady and full-time employment trends for less-educated single mothers. Similar to Figure 1A, these employment trends are consistent with a growing economy attracting single mothers into the labor force, pro-work welfare reforms of the 1996 Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA), and expansions in the Earned Income Tax Credit (EITC).

Wage Income and Poverty

Single mothers' annual wage income is reported by educational attainment in Table 1. The mean wage income for all single mothers is $13,155 (in 2004 dollars); conditional on employment, single mothers had an average income of $16,928. The average unconditional wage income of single mothers without a high school diploma is $4,874.

Figure 1A: Employment Trends of Single Mothers by Educational Attainment (1989-2004)

KEY: All — > HS Education — < HS Education

Figure 1B: Labor Force Participation of Single Mothers Without High School Diploma (1989-2004)

KEY: Any Work Hours — Part-Time Work — Full-Time Work

36 percent of all single mothers and 64 percent of single mothers with less than a high school education reported living in poverty, where poverty is defined as a household's income-to-needs ratio (INR) falling below 1.[12] Figure 2 presents trends in poverty rates during the 1989-2004 period. The overall poverty rate declined by nearly 35 percent between 1993 and 2000, but leveled off or rose slightly following the recession of 2001. Those without a high school diploma, who also had the lowest employment rates, had much higher poverty rates than those with higher levels of educational attainment. Note that poverty rates among working single mothers remained fairly steady over the period, suggesting that much of the observed trends in poverty can be explained by employment trends.

Welfare Receipt

A single mother is defined as receiving welfare if she reports receiving some income from public assistance in the previous year. 22 percent of all single mothers and 41 percent of single mothers with less than a high school education reported receiving public assistance benefits during the 1989-2004

period. Figure 3 shows the dramatic decline in welfare receipt over time, with the decline beginning prior to PRWORA, but accelerating following its passage.
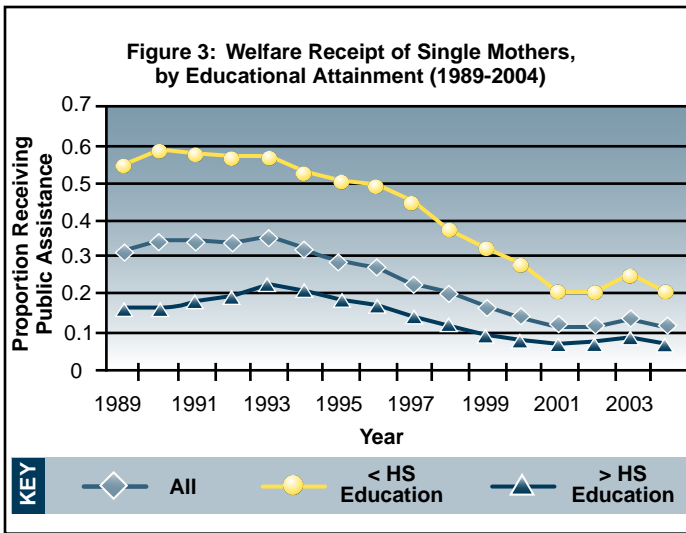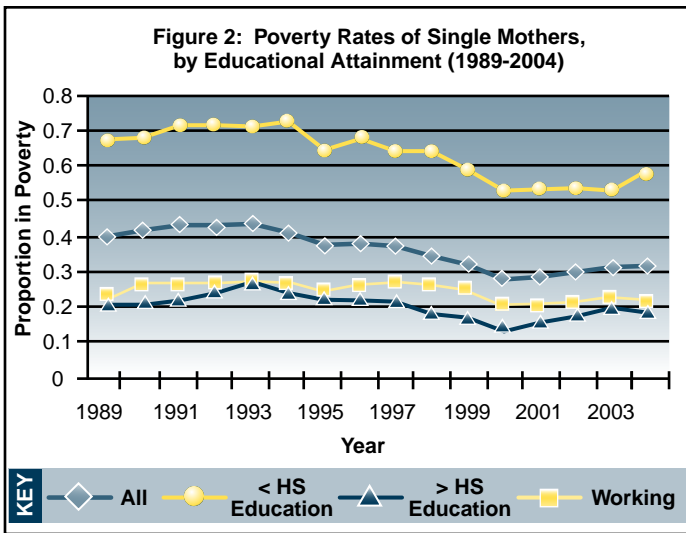
Independent Variables

Minimum Wage

The key independent variable in this analysis is the minimum wage, measured as the natural log of the larger of the state or federal minimum wage.[13] During the 1989-2004 period, there were two federal minimum wage increases, in 1990-91 from $3.35 per hour to $4.25 per hour, and again in 1996-97, from $4.25 per hour to $5.15 per hour. At the same time, 19 state legislatures raised their state minimum wage levels. Over time, states that have set minimum wages above the federal level have increasingly chosen to set their wages at higher multiples of the federal minimum wage. The mean state minimum wage among those states was 13 percent higher than the federal minimum wage in 1995 and over 25 percent higher than the federal minimum wage in 2004. The Appendix Table lists state and federal minimum wage changes over the 1989-2004 period. During the sample period examined, most state minimum wage changes occurred in Northeastern states (notably Vermont, Massachusetts, Rhode Island, and Connecticut) and Pacific states (particularly Washington, Oregon, California, Alaska, and Hawaii). Because the inclusion of year effects in the specification described in equations (1) and (2) captures much of the variation in federal minimum wages, minimum wage changes in the above states are the most important sources of identification.

State Economic Controls

State economic conditions are expected to influence single mothers' employment outcomes. As in Burkhauser et al. (2000a), Card and Krueger (1995), and Deere et al. (1995), several state and year-specific measures of economic health are included as controls. First, a time-varying state-level measure of the prime age (25-54) male unemployment rate is included to capture changes in macroeconomic conditions that may be correlated with the adoption of state-level minimum wage changes and with changes in employment. Second, I include the mean wage rate earned by adult workers (aged 25-64) to capture changes in the attractiveness of market work and changes in the state wage distribution. And finally, the natural log of the state Gross Domestic Product (GDP) is included to capture state-specific aggregate economic growth.[14]

Welfare Policy Variables

During the period from 1989-2004, many state-specific welfare reforms were adopted, as states applied to the federal government for waivers from federal welfare regulations. Between January 1987 and August 1996, 46 states — including the District of Columbia — received approval to implement at least one demonstration project to amend their Aid to Families

Figure 2: Poverty Rates of Single Mothers, by Educational Attainment (1989-2004)

Y-axis: Proportion in Poverty (0 to 0.8)
X-axis: Year (1989-2003)

KEY: All (◇) | < HS Education (○) | > HS Education (▲) | Working (■)

Figure 3: Welfare Receipt of Single Mothers, by Educational Attainment (1989-2004)

Y-axis: Proportion Receiving Public Assistance (0 to 0.7)
X-axis: Year (1989-2003)

KEY: All (◇) | < HS Education (○) | > HS Education (▲)

the year, that fraction is coded in the relevant state and year.

Four key welfare reform policies are included in the analysis: work requirements, time limits for welfare benefits, family caps, and sanctions for non-compliance with child support arrangements. Among the four policies, work requirements provide an unambiguous incentive to increase labor supply. Time limits reduce long-run welfare benefits and may induce single mothers on welfare to increase labor supply (see Grogger, 2002, 2003, and 2004 for detailed discussions of the effects of time limits). The family cap and child support enforcement policies are expected to affect labor supply indirectly. Family caps reduce or eliminate the incremental AFDC/TANF benefits if a single mother on welfare has an additional child while on the welfare rolls. This policy provides a disincentive for additional out of wedlock childbearing and a potential incentive to increase labor supply in the presence of additional new children because additional benefits will not be forthcoming. Sanctions for non-compliance with child support arrangements provide incentives for welfare mothers to establish paternity and to induce fathers to pay child support. The effect of this policy on labor supply is ambiguous — if it encourages mothers to obtain child support, it may decrease incentives for work; however, if mothers do not want contact with the father, failing to assist the state in establishing paternity would result in a welfare benefit cut, creating incentives to increase labor supply.

In addition to welfare waivers, the natural log of the state and year-specific maximum AFDC and food stamp (FS) benefit for a family of three is included to capture the attractiveness of unemployment. Declines in a state's real AFDC-food stamp benefit are expected to increase labor supply (Moffitt, 1992).

Maximum EITC Credit

Several studies in the literature have found that expansions in the EITC are associated with an increase in labor supply, though this effect is concentrated along the extensive margin (see, for example, Hotz and Scholz, 2003; Eissa and Hoynes, 2005; Meyer and Rosenbaum, 2001; Ellwood, 2000; Grogger, 2003; Meyer and Rosenbaum, 2000; Hotz et al., 2002; Eissa and Liebman, 1996). While there were large expansions in the federal EITC subsidy rate and maximum credit in 1990, 1993, and 1996, these policy changes will be largely captured by year effects in the models. However, from 1989 to 2004, 11 states enacted or changed their refundable EITC credit, thus increasing the maximum credit available to workers. New York, Minnesota, and Vermont each offered refundable credits of at least 30 percent of the federal EITC, which would increase the maximum credit by nearly $1,200 for a family with two or more children.[17] Because the EITC may have an important effect on labor supply decisions for single mothers, a variable measuring the natural log of the higher of the state or federal maximum EITC benefit is included.

with Dependent Children (AFDC) and Job Opportunities and Basic Skills (JOBS) programs.[15] Of the states that received approval, 39 actually implemented the waivers before PRWORA was passed in August 1996.[16] This act instituted, at the federal level, many of the welfare waivers with which states had been experimenting and it also facilitated states adopting different types of provisions. The inclusion of year effects in the econometric specification will capture much of the federal implementation of welfare reform; thus, welfare reform effects will be identified from variation in state-specific implementation of welfare waivers around a trend. These welfare waivers may affect the labor supply decisions of single mothers, particularly poor single mothers who had been, are, or anticipate joining the welfare rolls.

Data on welfare waivers are obtained from the Council of Economic Advisors (1999), the Urban Institute, and Horvath-Rose and Peters (2001). Horvath-Rose and Peters interviewed officials from many states in order to collect accurate data about the statewide scope of implementation. If welfare waivers were not adopted statewide, the relevant welfare waivers are coded proportional to the share of the population covered. Moreover, if a reform was only adopted for some fraction of

Individual Level Characteristics

Finally, a set of individual and family-level demographic characteristics expected to affect labor supply are included. These include age, age squared, race, education (measured by whether the woman has less then a high school degree, a high school degree, some college, a college degree, or some post college training), whether the mother has a disability that limits work, whether there are young children under 6 in the household, the number of children in the house, and whether the mother lives in a metropolitan statistical area (MSA).

There are 76,034 single mothers in the sample with non-missing observations for the dependent and independent variables. Of this sample, approximately 22 percent (16,370) had not completed high school and 42 percent (32,194) had received some post-high school education.[18]

Results

Wage Effects

If the minimum wage is to have an effect on the employment outcomes of single mothers, it should be the case that workers in this population earn wages that are likely to be affected by minimum wage policy. Table 2A shows the wage distribution for working single mothers during the 1989-2004 period. All wage rates are in 2004 dollars and are calculated as the ratio of annual wage income to annual hours worked.[19] Row (1) shows that the majority of single mothers (53.7 percent)

already earned wage rates higher than $7.00 during the sample period, and 34 percent earned wages greater than $10.00 per hour. Thus, many single mothers at the higher end of the skill distribution are not expected to be affected by minimum wage policy, a point emphasized in Burkhauser and Sabia (2007). To better differentiate among the heterogeneous skill levels in this population, the remaining three rows examine the sample of working single mothers by their education attainment to better identify low-skilled single mothers, who are most likely to be affected by minimum wage changes.

Row (2) shows the wage distribution for those with a high school degree or less and row (3) shows the distribution for those who had not completed high school. In each of these rows, there is a much larger share of single mothers earning lower wages; 72 percent of working single mothers without a high school degree had wage rates less than $7.00 per hour and over 50 percent had wage rates less than $5.00 per hour. Thus, among single mothers, minimum wage policy will most likely affect those who are less educated. On the other hand, single mothers with some post-high school education are least likely to be affected by minimum wage changes, as shown in row (4). Here, the vast majority of single mothers (almost 70 percent) earn wage rates greater than $7.00 per hour.

In Table 2B, estimates of the effect of minimum wage increases on working single mothers' wages are presented.[20] Each model includes state effects, year effects, and state-specific quadratic time trends.[21] The specifications differ in

Table 2A							
Wage Distribution of Working Single Mothers, 1989-2004							
	Real Hourly Wage Rate[1]						Total
	< $3.00	$3.00 to $4.00	$4.01 to $5.00	$5.01 to $7.00	$7.01 to $10.00	> $10.00	
All Working Single Mothers	10.1	8.4	9.7	18.2	19.6	34.1	100.0
Single Mothers with ≤ High School Education	14.4	11.3	12.5	21.3	18.7	21.9	100.0
Single Mothers with < High School Education	21.1	14.6	14.6	21.7	14.2	13.8	100.0
Single Mothers with > High School Education	5.3	5.0	6.5	14.5	20.6	48.2	100.0

Source: Computed by the author.
Data: March 1990 to March 2005 Current Population Survey. Sample limited to unmarried mothers aged 15-55.
[1]Wage rate measured in 2004 dollars.

	Table 2B					
Effect of Minimum Wage Increases on Wages of Working Single Mothers						
	< HS Education				> HS Education	
	(1)	(2)	(3)	(4)	(5)	(6)
Log (Minimum Wage)	4.61**	4.52**	4.08*	3.82*	0.464	-0.236
	(2.32)	(2.21)	(2.28)	(2.17)	(1.90)	(1.80)
Min Wage Elasticity	0.718	0.704	0.636	0.595	0.039	-0.020
State Effects?	Y	Y	Y	Y	Y	Y
Year Effects?	Y	Y	Y	Y	Y	Y
State-Specific Quadratic Time Trends?	Y	Y	Y	Y	Y	Y
Demographic Controls[1]	N	Y	Y	Y	N	Y
State Economic Trends[2]	N	N	Y	Y	N	Y
State Policy Variables[3]	N	N	N	Y	N	Y
N	8,704	8,704	8,704	8,704	27,337	27,337

*** Significant at 1% level; ** Significant at 5% level; * Significant at 10% level
Standard errors are clustered at the state level. All regressions are weighted and include full list of control variables listed in Table 1.
Source: Computed by the author.
Data: March 1990 to March 2005 Current Population Survey.
[1] These include controls for race, age, urbanicity, education (if applicable), physical limitation, presence of child under 6, and number of children.
[2] These include the male unemployment rate, average wage rate of working adults, and state GDP.
[3] These include the maximum EITC benefit available in the state, maximum AFDC-food stamp benefit, and work requirement.

their inclusion of demographic controls, state economic variables, and other state policy variables. Across models (see columns 1-4), there is consistent evidence that minimum wage increases are positively associated with the wage rates of working single mothers without a high school diploma. A 10 percent increase in the minimum wage is associated with a 6 to 7 percent increase in less-educated single mothers' wage rates. However, for more highly skilled single mothers—those with some post high school-education—there is no evidence that minimum wages affect their wage rates (see columns 5-6). This is consistent with the findings in Table 2A—more highly skilled single mothers already earn wages such that they are not directly affected by minimum wage policy.

Taken together, the evidence in Tables 2A and 2B suggests that any effects of minimum wage policy on single mothers is likely to be driven by their effects on less-educated single

mothers. However, in the employment and hours analyses below, estimates of the effect of minimum wage increases on more highly educated single mothers are presented as a falsification test for results on the sample of less-skilled mothers. If significant employment effects were found for both less-educated and more highly educated single mothers, this would suggest that the identification strategy employed may not be credible and that the estimate β could be biased due to unmeasured state trends associated with minimum wage increases. On the other hand, the absence of effects for more highly educated single mothers would bolster the credibility of interpreting significant effects for less-skilled workers causally.

Employment Effects
Table 3 presents estimates of the effect of minimum wage increases on the employment of single mothers, by education

	All	≤ HS Educ	< HS Educ	> HS Educ
	(1)	(2)	(3)	(4)
Log (Minimum Wage)	-0.065	-0.206**	-0.333**	0.111
	(0.095)	(0.096)	(0.130)	(0.106)
Min Wage Elasticity	-0.084	-0.293	-0.603	0.126
Log (Max EITC Benefit)	0.110***	0.107***	0.085***	0.091***
	(0.015)	(0.023)	(0.029)	(0.017)
Work Requirement	0.011	0.021	-0.034	-0.001
	(0.019)	(0.024)	(0.031)	(0.026)
Time Limit	0.005	0.007	-0.054	0.001
	(0.017)	(0.026)	(0.043)	(0.021)
Family Cap	0.015	0.026	0.072**	0.001
	(0.015)	(0.019)	(0.030)	(0.017)
Paternity Enforcement	0.011	0.017	0.049	0.008
	(0.021)	(0.032)	(0.073)	(0.024)
Log (Max AFDC-FS3 Benefit)	-0.111	-0.049	0.206	-0.244*
	(0.155)	(0.204)	(0.311)	(0.143)
Less than HS Educ[1]	-0.169***	-0.163***	---	---
	(0.009)	(0.009)		
Some College[1]	0.042***	---	---	-0.050***
	(0.005)			(0.005)
College[1]	0.083***	---	---	---
	(0.008)			
Post-College[1]	0.099***	---	---	0.016**
	(0.011)			(0.007)
Disability	-0.444***	-0.452***	-0.426***	-0.432***
	(0.007)	(0.011)	(0.017)	(0.017)
Child < 6 years	-0.068***	-0.083***	-0.099***	-0.048***
	(0.007)	(0.011)	(0.015)	(0.006)

Table 3

Effect of Minimum Wage Increases on Single Mothers' Employment

Table 3 (Continued)

Effect of Minimum Wage Increases on Single Mothers' Employment

	All	≤ HS Educ	< HS Educ	> HS Educ
	(1)	(2)	(3)	(4)
Number of Children	-0.062***	-0.063***	-0.058***	-0.052***
	(0.003)	(0.004)	(0.005)	(0.006)
Age	0.024***	0.025***	0.034***	0.018***
	(0.002)	(0.002)	(0.003)	(0.002)
Age Squared	-0.003***	-0.0003***	-0.0004***	-0.0002***
	(0.00002)	(0.00003)	(0.00004)	(0.00003)
Black[2]	-0.034***	-0.046***	-0.028*	-0.018**
	(0.009)	(0.013)	(0.016)	(0.007)
Non-MSA	-0.004	-0.010	-0.032	0.001
	(0.009)	(0.011)	(0.020)	(0.009)
State Unemploy-ment Rate	-0.288	-0.238	0.077	-0.346*
	(0.202)	(0.254)	(0.421)	(0.203)
Log (State Mean Wage)	0.034**	0.038*	-0.001	0.028*
	(0.016)	(0.021)	(0.038)	(0.017)
Log (State GDP)	0.108	0.316**	0.361*	-0.166
	(0.120)	(0.152)	(0.214)	(0.127)
State Effects?	Y	Y	Y	Y
Year Effects?	Y	Y	Y	Y
State-Specific Quadratic Time Trends?	Y	Y	Y	Y
N	76,034	43,840	16,370	32,194

*** Significant at 1% level; ** Significant at 5% level; * Significant at 10% level.
Standard errors are clustered at the state level. All regressions are weighted.
Source: Computed by the author.
Data: March 1990 to March 2005 Current Population Survey.
[1]Omitted category is high school completion.
[2]Omitted category is Caucasian. Asian, American Indian, and Other race categories are also included in all models.

Table 4

Effect of Minimum Wage Increases on Single Mothers' Usual Hours and Weeks Worked

	All			≤ HS			< HS			> HS		
	Weekly Hours	Annual Weeks	Annual Hours	Weekly Hours	Annual Weeks	Annual Hours	Weekly Hours	Annual Weeks	Annual Hours	Weekly Hours	Annual Weeks	Annual Hours
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Log (Minimum Wage)	-2.68	-8.00**	-250.0	-10.04***	-14.26***	-562.5***	-15.70***	-17.96***	-791.6***	5.37	-1.12	77.13
	(3.90)	(4.16)	(172.6)	(3.83)	(5.35)	(209.4)	(4.99)	(6.28)	(231.8)	(4.72)	(3.57)	(167.5)
Min Wage Elasticity	-0.091	-0.231	-0.186	-0.388	-0.474	-0.489	-0.792	-0.828	-0.990	0.157	-0.027	0.048
Log (Max EITC Benefit)	3.46***	4.08***	121.4***	3.30***	3.55***	97.43***	2.61**	2.33	69.25	3.08***	4.43***	144.6***
	(0.515)	(0.640)	(24.08)	(0.751)	(0.982)	(34.73)	(1.14)	(1.48)	(56.86)	(0.753)	(0.682)	(35.53)
Work Requirement	0.784	2.35**	97.68**	0.915	2.57**	108.6**	-2.12	-0.260	-44.12	0.617	2.12	83.76
	(0.799)	(1.00)	(41.52)	(1.03)	(1.27)	(51.39)	(1.33)	(1.72)	(66.31)	(0.996)	(1.30)	(52.08)
Time Limit	-0.403	-0.659	-57.15	0.119	-0.302	-37.20	-1.20	-4.14**	-158.3	-1.21	-1.10	-85.25
	(0.649)	(0.769)	(35.29)	(0.846)	(1.28)	(44.4)	(1.44)	(2.04)	(85.73)	(0.967)	(1.33)	(61.22)
Family Cap	1.10	0.843	47.03	1.57**	1.11	52.66	3.45***	2.87***	127.5**	0.444	0.522	37.80
	(0.565)	(0.849)	(30.14)	(0.687)	(1.03)	(35.87)	(1.08)	(1.44)	(51.05)	(0.722)	(1.04)	(41.17)
Paternity Enforcement	1.00	1.18	82.21*	0.889	1.03	75.19	1.12	1.12	73.60	1.44	1.59	100.1*
	(0.932)	(1.04)	(45.54)	(1.25)	(1.71)	(60.01)	(2.79)	(2.99)	(113.8)	(1.20)	(1.15)	(55.01)
Log (Max AFDC-FS3 Benefit)	-5.28	-6.82	-359.5	-3.17	-4.53	-292.7	7.90	5.23	151.1	-8.79	-9.88	-407.4
	(6.17)	(8.34)	(322.7)	(8.09)	(10.58)	(411.8)	(12.97)	(11.97)	(509.4)	(6.43)	(8.77)	(375.9)
Less than HS Educ[1]	-7.07***	-9.17***	-377.4***	-6.96***	-9.08***	-378.3***	---	---	---	---	---	---
	(0.287)	(0.369)	(11.61)	(0.297)	(0.371)	(12.08)						
Some College[1]	1.80***	2.48***	104.6***	---	---	---	---	---	---	-3.06***	-2.93***	-166.4***
	(0.193)	(0.258)	(10.30)							(0.246)	(0.234)	(12.83)
College[1]	4.64***	5.01***	262.8***	---	---	---	---	---	---	---	---	---
	(0.341)	(0.408)	(17.64)									
Post-College[1]	6.08***	5.72***	334.2***	---	---	---	---	---	---	1.46***	0.819**	74.70***
	(0.396)	(0.566)	(21.23)							(0.329)	(0.407)	(17.54)
Disability	-18.25***	-25.03***	-1000.4***	-18.19***	-24.42***	-962.9***	-16.44***	-21.56***	-818.3***	-18.48***	-26.55***	-1090.4***
	(0.348)	(0.394)	(18.57)	(0.438)	(0.488)	(19.71)	(0.625)	(0.607)	(22.47)	(0.688)	(0.657)	(32.75)
Child < 6 years	-3.01***	-4.53***	-191.0***	-3.43***	-5.41***	-218.7***	-3.65***	-5.49***	-212.8***	-2.41***	-3.38**	-153.5***
	(0.251)	(0.329)	(11.67)	(0.427)	(0.473)	(19.07)	(0.602)	(0.669)	(27.81)	(0.164)	(0.285)	(10.25)

level. Each model includes state effects, year effects, state-specific time trends, and the full set of control variables described in Table 1. Identification comes from variation in the minimum wage around state-specific trends.

The dependent variable measures whether the single mother reported any work hours. Column (1) includes the full sample of single mothers, while columns (2)-(4) differentiate the sample by education level. The results in column (1) show that the minimum wage is negatively associated with single

mothers' employment, but the estimated coefficient is not significant. This is not surprising given that a substantial share of single mothers at the higher end of the skill distribution are not directly affected by minimum wage policy. However, when we focus on less-educated single mothers, who comprise a much less skilled population (columns 2 and 3), there is evidence of significant adverse employment effects. A 10 percent increase in the minimum wage is associated with a 2.9 percent reduction in employment for single mothers with

	All			≤HS			< HS			> HS		
Table 4 (Continued)												
Effect of Minimum Wage Increases on Single Mothers' Usual Hours and Weeks Worked												
	Weekly Hours	**Annual Weeks**	**Annual Hours**	**Weekly Hours**	**Annual Weeks**	**Annual Hours**	**Weekly Hours**	**Annual Weeks**	**Annual Hours**	**Weekly Hours**	**Annual Weeks**	**Annual Hours**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Number of Children	-2.55***	-3.38***	-136.41***	-2.49***	-3.22***	-127.6***	-2.12***	-2.72***	-102.9***	-2.40***	-3.35***	-143.3***
	(0.136)	(0.148)	(6.42)	(0.158)	(0.183)	(7.51)	(0.197)	(0.261)	(9.37)	(0.230)	(0.163)	(8.49)
Age	1.42***	2.24***	102.9***	1.39***	2.18***	96.89***	1.68***	2.36***	100.2***	1.38***	2.11***	108.6***
	(0.073)	(0.072)	(3.14)	(0.084)	(0.106)	(4.60)	(0.127)	(0.177)	(7.34)	(0.122)	(0.132)	(6.20)
Age Squared	-0.018***	-0.027***	-1.25***	-0.017***	-0.026***	-1.16***	-0.021***	-0.028***	-1.21***	-0.018***	-0.026***	-1.34***
	(0.001)	(0.001)	(0.044)	(0.001)	(0.001)	(0.061)	(0.002)	(0.002)	(0.103)	(0.002)	(0.002)	(0.082)
Black	-1.33***	-2.22***	-87.82***	-1.92***	-3.13***	-128.2***	-1.10*	-2.28***	-83.59**	-0.480	-0.957**	-30.21
	(0.352)	(0.438)	(17.90)	(0.487)	(0.571)	(23.11)	(0.641)	(0.804)	(34.22)	(0.365)	(0.456)	(21.23)
Non-MSA	-0.468	-1.03**	-52.40***	-0.503	-1.20**	-50.45***	-1.20*	-1.59*	-61.38**	-0.537	-0.879*	-55.92***
	(0.342)	(0.413)	(16.39)	(0.403)	(0.467)	(18.72)	(0.698)	(0.804)	(30.97)	(0.477)	(0.450)	(20.06)
State Unemployment Rate	-10.39	-21.38**	-862.59**	-6.87	-11.61	-502.49	12.30	-4.79	117.3	-13.67	-33.82***	-1254.5***
	(7.20)	(10.78)	(382.2)	(8.57)	(13.49)	(457.7)	(12.12)	(17.23)	(600.8)	(8.87)	(10.69)	(456.2)
Ln (State Mean Wage)	1.37**	2.44***	97.97***	1.80**	3.24**	133.0**	0.939	1.58	86.96	0.830	1.39*	57.27
	(0.596)	(0.876)	(35.90)	(0.854)	(1.27)	(55.67)	(1.33)	(1.97)	(75.56)	(0.667)	(0.786)	(39.21)
Ln (State GDP)	3.72	0.545	55.58	11.41**	8.79*	361.0*	14.40*	14.75	699.0	-7.42	-10.90	-410.2
	(4.35)	(4.95)	(198.6)	(5.29)	(5.64)	(208.8)	(7.63)	(8.96)	(382.1)	(6.02)	(6.98)	(319.3)
State Effects?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year Effects?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
State-Specific Quadratic Time Trends?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	76,034	76,034	76,034	43,840	43,840	48,340	16,370	16,370	16,370	32,194	32,194	32,194

*** Significant at 1% level; ** Significant at 5% level; * Significant at 10% level
Standard errors are clustered at the state level. All regressions are weighted.
Source: Computed by the author.
Data: March 1990 to March 2005 Current Population Survey.
[1]Omitted category is high school completion.
[2]Omitted category is Caucasian; Asian, American Indian, and Other race categories are also included in all models.

a high school degree or less and a 6.0 percent reduction in employment for single mothers without a high school diploma.[22] These estimated elasticities are similar in magnitude to those obtained by Burkhauser et al. (1996a) and Neumark (2007) for less-educated young African Americans, but are generally larger than those found for teenagers (Neumark and Wascher, 2007). In contrast to results for less-educated single mothers, the findings in column (4) show that minimum wage increases do not affect employment of more highly educated single mothers, where there is an insignificant positive coefficient. This finding adds some confidence to a causal interpretation of the estimates obtained for less-educated single mothers.[23]

In contrast to adverse employment effects for minimum wage increases, there is consistent evidence that expansions in the maximum EITC refundable credit increase employment of single mothers. A 10 percent increase in the maximum

EITC credit is associated with a 1.0 to 1.5 percent increase in employment, consistent with several previous findings (Hotz and Scholz, 2003; Eissa et al., 2005; Meyer and Rosenbaum, 2001; Ellwood, 2000; Grogger, 2003; Meyer and Rosenbaum, 2000; Hotz et al., 2002; and Eissa and Liebman, 1996). No other policy variables were consistently significant in these models. However, coefficients on state-specific time trends were highly significant, suggesting that unmeasured state trends are important correlates of single mothers' labor supply.

Finally, individual characteristics emerge as important determinants of labor supply. Less-educated single mothers, those with disabilities that limited work, those with younger children, those with greater numbers of children, those that are younger, and blacks (relative to whites) are each less likely to be employed than their respective counterparts.

In summary, the findings in Table 3 suggest that minimum wage increases have diminished employment for less-educated single mothers. However, examining only employment effects may obscure the full effects of minimum wage increases. For example, employers may respond to minimum wage increases not only by reducing employment, but also by reducing

hours and weeks of work. In fact, recent work by Couch and Wittenburg (2001) and Sabia (2006) suggest that hours elasticities may be larger than employment elasticities.

Hours and Weeks Effects
Table 4 presents estimates of the effect of minimum wage increases on single mothers' usual hours worked per week, weeks worked per year, and annual work hours. As with employment effects, the effects on work hours for the full sample of single mothers is fairly weak (see columns 1-3). However, for the sample of less-educated single mothers, there is consistent evidence that minimum wage increases adversely affect hours and weeks worked. For single mothers with a high school degree or less (columns 4-6), a 10 percent increase in the minimum wage is associated with a 3.8 percent reduction in usual weekly hours worked, a 4.7 reduction in weeks worked, and a 4.9 percent reduction in annual hours. These estimated elasticities are larger in magnitude than the employment elasticity for this group (-0.29), consistent with the findings of Couch and Wittenberg (2001) and Sabia (2006). Moreover, the results suggest that minimum wage increases adversely affect

Table 5							
Effect of Minimum Wage Increases on Steady and Full-Time Work							
	All		**≤ HS**		**< HS**		**> HS**	
	Steady Work	**Full-Time Work**	**Steady Work**	**Full-Time Work**	**Steady Work**	**Full-Time Work**	**Steady Work**	**Full-Time Work**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log (Minimum Wage)	-0.175**	-0.180***	-0.259**	-0.249**	-0.322**	-0.378***	-0.107	-0.116
	(0.070)	(0.071)	(0.108)	(0.119)	(0.147)	(0.103)	(0.067)	(0.160)
Min Wage Elasticity	-0.273	-0.363	-0.470	-0.606	-0.847	-1.454	-0.140	-0.189
State Effects?	Y	Y	Y	Y	Y	Y	Y	Y
Year Effects?	Y	Y	Y	Y	Y	Y	Y	Y
State-Specific Quadratic Time Trends?	Y	Y	Y	Y	Y	Y	Y	Y
N	76,034	76,034	43,840	43,840	16,370	16,370	32,194	32,194

*** Significant at 1% level; ** Significant at 5% level; * Significant at 10% level
Standard errors are clustered at the state level. All regressions are weighted and include full list of control variables listed in Table 1.
Source: Computed by the author.
Data: March 1990 to March 2005 Current Population Survey.

not just usual weekly hours worked, but also weeks worked per year. The largest elasticity is for the longer-run outcome: annual hours.

For single mothers without a high school diploma (columns 7-9), the hours and weeks effects are even larger. A 10 percent increase in the minimum wage is associated with a 7.9 percent reduction in usual weekly hours worked, an 8.3 percent reduction in annual weeks worked, and a 9.9 percent reduction in annual hours worked. Again, these estimated elasticities are larger in magnitude than the employment elasticity for this group (-0.60), suggesting that examining only employment will understate the full adverse effects of minimum wage increases. The credibility of the identification strategy used to obtain these estimates is bolstered by the fact that minimum wage increases have no effect on hours and weeks worked for more highly educated single mothers (columns 10-12).

Again, in contrast to the minimum wage, expansions in the EITC had significant effects on hours and weeks worked. Implied elasticities range from 0.08 to 0.15, which are nearly identical to EITC elasticities on employment, suggesting that EITC effects are strongest at the extensive margin, consistent with previous findings (Hotz and Scholz, 2003; Eissa et al., 2005; Meyer and Rosenbaum, 2001; Ellwood, 2000; Grogger, 2003; Meyer and Rosenbaum, 2000; Hotz et al., 2002; and Eissa and Liebman, 1996).

In Table 5, information on hours and weeks worked are combined to create commonly used measures of employment: steady employment and full-time employment. As noted above, a single mother is defined as being steadily employed if she worked an average of 20 hours per week for 52 weeks

Table 6							
Robustness of Estimates of Effect of Minimum Wage on Single Mothers' Employment and Hours							
	Employment		Annual Hours		Employment		Annual Hours	
	≤ HS	< HS	≤ HS	< HS	≤ HS	<HS	≤ HS	<HS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Minimum Wage	-0.046**	-0.074***	-100.6**	-175.3***	---	---	---	---
	(0.019)	(0.024)	(41.00)	(47.02)				
Log (Minimum Wage)	---	---	---	---	0.455	---	79.89	---
					(0.329)		(691.5)	
One Year Lag [Log (Minwage)]	---	---	---	---	-0.649**	-0.243***	-637.0	-0.565.7***
					(0.323)	(0.087)	(673.9)	(196.8)
Min Wage Elasticity	-0.302	-0.619	-0.404	-1.013	-0.276	-0.346	-0.485	-0.492
State Effects?	Y	Y	Y	Y	Y	Y	Y	Y
Year Effects?	Y	Y	Y	Y	Y	Y	Y	Y
State-Specific Quadratic Time Trends?	Y	Y	Y	Y	Y	Y	Y	Y
N	43,840	16,370	43,840	16,370	43,840	43,840	43,840	43,840

*** Significant at 1% level; ** Significant at 5% level; * Significant at 10% level
Standard errors are clustered at the state level. All regressions are weighted and include full list of control variables listed in Table 1.

Table 7

Effect of Minimum Wage Increases on Wage Income and Poverty

	All		< HS		> HS	
	Wage Income	Poverty	Wage Income	Poverty	Wage Income	Poverty
	(1)	(2)	(3)	(4)	(5)	(6)
Log (Minimum Wage)	-5970.8**	-0.046	-4281.7**	-0.268	1211.1	-0.017
	(2642.5)	(0.076)	(2028.4)	(0.168)	(5469.2)	(0.099)
Min Wage Elasticity	-0.454	-0.127	-0.879	-0.421	0.063	-0.084
State Effects?	Y	Y	Y	Y	Y	Y
Year Effects?	Y	Y	Y	Y	Y	Y
State-Specific Quadratic Time Trends?	Y	Y	Y	Y	Y	Y
N	76,034	76,034	16,370	16,370	32,194	32,194

*** Significant at 1% level; ** Significant at 5% level; * Significant at 10% level
Standard errors are clustered at the state level. All regressions are weighted and include full list of control variables listed in Table 1.
Source: Computed by the author.
Data: March 1990 to March 2005 Current Population Survey.

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in the last year (1,040 annual hours) and full-time employed if she worked an average of 35 hours per week for 52 weeks in the last year (1,820 annual hours).[24] Consistent with the above findings, the evidence suggests that minimum wage increases adversely affect steady and full-time employment among the least educated single mothers (columns 3-6), but have no effect on more highly educated single mothers (columns 7-8). A 10 percent increase in the minimum wage is associated with an 8.5 percent reduction in steady employment and a 14.5 percent reduction in full-time employment for single mothers with less than a high school education. Taken together, the results in Tables 3-5 provide consistent evidence that minimum wage increases adversely affect less-educated single mothers' employment, usual weekly hours worked, weeks worked per year, and annual hours. The robustness of these findings is examined in Table 6.

In columns (1)-(4) of Table 6, the minimum wage level is used as the key independent variable rather than the natural log of the minimum wage. Across models for employment and annual hours, the estimated elasticities using minimum wage levels are comparable to those obtained using the natural log of the minimum wage.

Neumark et al. (2004), Burkhauser et al. (2000a), Baker er al. (1999), and Page et al. (2005) suggest there may be important lagged minimum wage effects. That is, minimum wage changes in period t may affect employment and hours in period t+1. The specifications in columns (5) and (7) include both contemporaneous and lagged minimum wage variables. The implied long-run elasticities in both models are significant and are consistent with previous estimates obtained without the lag. However, the magnitude of the estimated parameter on the lagged minimum wage is larger than the coefficient on the contemporaneous minimum wage variable. In columns (6) and (8), only the lagged minimum wage variable is included. Again, the elasticities are consistent with previous findings.

The above results suggest consistent evidence of adverse employment and hours effects of minimum wage increases on the least skilled single mothers. However, effects on income and poverty are also of interest. Less-educated mothers who keep their jobs and do not experience important hours or weeks reductions as a result of a minimum wage increase may see their income rise as a result of a wage hike, which may lift them out of poverty. However, those who lose their jobs or have their hours substantially reduced as a result of a minimum

wage increase may see their income decline, causing them to fall into poverty. Thus, the next set of results examines the net effect of minimum wage increases on single mothers' wage income and poverty.

Wage Income and Poverty

The results in Table 7 suggest that, on net, the adverse employment and hours effects of minimum wage increases dominate any positive effects of wage gains. While the results in Table 2A show that minimum wage hikes increase wage rates of low-skilled working single mothers, the findings in column (3) of Table 7 suggests that the minimum wage increases actually reduce their wage income. A 10 percent increase in the minimum wage is associated with an 8.8 percent reduction in the wage income of unmarried mothers without a high school degree (column 3). Falsification tests on more highly educated single mothers (column 5) suggest that the negative correlation between minimum wage increases and income is likely not driven by unmeasured heterogeneity.

Next, we turn to poverty. A number of studies (Neumark et al., 2004; Neumark and Wascher, 2001; Burkhauser et al., 1996b; Burkhauser and Finegan, 1989; Burkhauser and Harrison, 1999; Burkhauser and Sabia, 2004, 2007) have examined the effectiveness of minimum wage policy as an antipoverty tool among the working poor. The results in Table 7 suggest that, on net, raising the minimum wage is not an effective antipoverty tool among single mothers or even among less-skilled single mothers. There is little evidence that minimum wage increases have a significant effect on single mothers' overall poverty rates (column 2) or less-educated single mothers' poverty rates (column 4), findings that are consistent with Burkhauser and Sabia (2007). In sum, the results in Table 7 suggest that the adverse employment and hours effects of minimum wage increases lead to a reduction in single mothers' wage income and do not alleviate poverty among this vulnerable population.

Table 8								
Effect of Minimum Wage Increases on Welfare Receipt								
	All			**< HS**			**> HS**		
	All States	**30 States[1]**	**Young Child (30 States)**	**All States**	**30 States[1]**	**Young Child (30 States)**	**All States**	**30 States[1]**	**Young Child (30 States)**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
Log (Minimum Wage)	0.044	0.188***	0.277***	0.100	0.322*	0.429**	0.044	0.121	0.187
	(0.072)	(0.051)	(0.100)	(0.223)	(0.181)	(0.023)	(0.068)	(0.073)	(0.134)
Min Wage Elasticity	0.200	0.836	0.789	0.243	0.776	0.779	0.363	1.017	0.949
State Effects?	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year Effects?	Y	Y	Y	Y	Y	Y	Y	Y	Y
State-Specific Quadratic Time Trends?	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	76,034	57,692	21,110	16,370	13,629	5,787	32,194	22,635	7,271

*** Significant at 1% level; ** Significant at 5% level; * Significant at 10% level
Standard errors are clustered at the state level. All regressions are weighted and include full list of control variables listed in Table 1.
Source: Computed by the author.
Data: March 1990 to March 2005 Current Population Survey.
[1]These states are AK, AL, AR, CA, DC, DE, FL, GA, IL, KS, KY, LA, MA, MI, MO, MS, NC, NJ, NM, NY, OH, OK, PA, RI, SC, SD, TN, TX, WI, and WV.

Because minimum wage increases have negative effects on less-educated single mothers' employment, hours, and wage income, such hikes may have the unintended consequence of increasing welfare use. Page et al. (2005) find some evidence for this using aggregate state-level welfare caseload data. In Table 8, we attempt to replicate the findings by Page et al. (2005) using March CPS data. In the full sample of single mothers (column 1), there is a positive, but insignificant effect of minimum wage increases on single mothers' welfare use. This is consistent with the finding reported in footnote 9 of Page et al. (2005). The authors of that paper interpreted the absence of statistical significance as evidence that measurement error in the dependent variable—predicted welfare receipt probabilities—led to inflated standard errors.

In column (2), the sample is restricted to the 30 states that have at least 50 single mothers sampled in each state and in each year, which may reduce measurement error.[25] In this specification, there is some evidence that an increase in the minimum wage is associated with greater welfare receipt. This is also true for single mothers with a young child (under age 6), a population which is especially prone to welfare use (column 3). For these single mothers, a 10 percent increase in the minimum wage is associated with an approximately 8 percent increase in welfare receipt. However, one should exercise care in generalizing these estimates nationally given that the sample is restricted to "large" states.

As above, the welfare effects are strongest for single mothers without a high school diploma, the population which is expected to be most affected. In the sample of the largest states, a 10 percent increase in the minimum wage is associated with a 7.8 percent increase in welfare use among single mothers with a young child (column 6). Falsification tests reveal no significant effects of minimum wage increases on welfare use of more highly educated single mothers, though the coefficients are positive and large (see columns 7-9), suggesting that some caution should be taken in interpreting welfare estimates causally.

Conclusions

The 1990s and early 2000s saw important economic changes for single mothers. Employment rates, work hours, and wage income rose, while poverty rates and welfare use declined. The evidence presented in this study suggests that while pro-work welfare reforms, a growing macro-economy, and expansions in the Earned Income Tax Credit program may have each played a role in these positive economic trends, increases in the minimum wage did not. Rather, this study finds that minimum wage increases reduced less-educated single mothers' employment, hours worked, and wage income, while failing to alleviate poverty. For single mothers without a high school diploma, a 10 percent increase in the minimum wage is associated with a 6.0 percent reduction in employment, a 7.9 percent reduction in usual weekly hours, an 8.3 percent reduction in weeks worked, a 9.9 percent reduction in wage income, and no change in poverty. There is also some evidence that higher minimum wages may have the unintended consequence of increasing public assistance use by single mothers, particularly those with young children.

The results of this study should serve as a caution to policymakers who view raising the minimum wage as a way to offer a helping hand to single mothers. While some less-educated single mothers who do not have their work hours reduced after a minimum wage hike may be better off, others who lose their jobs or have their hours substantially reduced will be worse off; on net, this study finds that minimum wage increases actually reduce wage income among less-educated single mothers.

In contrast to increasing the minimum wage, which is poorly targeted toward poor single mothers and has important adverse employment, hours, and wage income effects for those who are less educated, a far more effective pro-work strategy would be to expand the federal Earned Income Tax Credit (EITC) or state supplements to it. The evidence in this study shows that a 10 percent increase in the state EITC refundable credit is associated with a 1.0 to 1.5 percent increase in employment for single mothers. Most working poor households—especially single mother and African American households—would benefit from the EITC, while only a small minority would gain from a minimum wage hike (Congressional Budget Office, 2007; Burkhauser et al., 1996b). And because EITC costs are not borne by employers, there will be no reduction in demand for low-skilled workers, as is the case with a minimum wage increase.

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Endnotes

1. During an October 2004 presidential debate, Senator Kerry stated, "It's long overdue time to raise the minimum wage. If we raise the minimum wage, which I will do over several years to $7 an hour, 9.2 million women who are trying to raise their families would earn another $3,800 a year." (Kerry, 2004)

2. Burkhauser and Sabia (2007) obtain these numbers using data from the Current Population Survey's Outgoing Rotation Group in March 2004.

3. The presence of a monopsonistic labor market provides one theoretical rationale why minimum wage hikes could, in principle, increase employment. However, recent studies by Aaronson and French (2006; 2007) suggest little evidence of monopsony power when examining the effects of minimum wage increases on output prices.

4. One line of criticism of the Card and Krueger (1994) fast food study concerns choice of research design (Hamermesh, 1995) and phone survey methodology (Welch, 1995). Criticism of Card and Krueger's CPS-based panel study have focused on the author's interpretation of year effects as well as the availability of sufficient within-state variation in the minimum wage to estimate policy impacts with sufficient precision (see, for example, Burkhauser et al., 2000a).

5. Brandon (1995) and Turner (1999) use data from the Survey of Income and Program Participation (SIPP) to estimate the effect of minimum wage increases on the probability of exit from Aid to Families with Dependent Children (AFDC) and reach opposite conclusions. However, these studies focus on only a few years of data and minimum wage effects are likely to be imprecisely estimated in short panels (Baker et al., 1999; Page et al., 2005). The Council of Economic Advisors (CEA) estimates the effects of welfare reform policies and minimum wage increases on welfare caseloads and finds that minimum wage hikes are associated with a decrease in welfare caseloads. However, Page et al. (2005) convincingly show that the treatment of state-specific time trends and the time period chosen for analysis can explain differences in their findings from that of the CEA.

6. However, in the minimum wage-employment results reported by Grogger (2003), there are no controls for state-specific time trends. Grogger (2003) does estimate models with state-specific linear and quadratic time trends, but does not report the full results of this estimation. He concludes that the exclusion of state-specific trends does not affect the time limit results, which are the primary focus of his paper.

7. The authors show that models without state-specific time trends actually find that minimum wage increases decrease welfare use and attribute this to the endogeneity of state minimum wage laws, which tend to be adopted when welfare rolls are falling.

8. In an analysis of residuals from regressions used in this paper, quadratic time trends better fit the data than linear trends. The sensitivity of the results was tested by including higher-order polynomials (up to five) in the specification of state trends and the results were substantively unchanged.

9. However, a recent paper by Sabia (2006) suggests that increased state-level variation in minimum wages in the 1997-2004 period have permitted estimation of significant minimum wage effects even after controlling for time trends.

10. Weighting is appropriate if one wishes to estimate the extent to which minimum wage increases will affect overall U.S. employment probabilities.

11. Moreover, while not expected, if measurement error is systematically correlated with state changes in minimum wage law and with single mothers' employment, then the estimate of β will be biased, though the direction of the bias is a prior uncertain. To address this concern, separate models were estimated on a sample restricted to states with at least 60 observations in each state and year. The results from these models, while not generalizable nationally, are generally consistent with estimates presented here.

12. The income-to-needs ratio is defined as the ratio of household income to the household-size adjusted federal poverty line.

13. The table in the appendix shows nominal state and federal minimum wages from 1989-2004. For years in which the federal minimum wage changed during the middle of a year, a weighted average of the federal minimum wage level during that year is coded.

14. An alternate measure of state economic growth was considered; the percentage change in growth from the previous period; results using that measure were not substantively different from those presented here.

15. States that either did not apply for approval or did not receive approval on their application were: Alaska, Kentucky, Nevada, New Mexico, and Rhode Island.

16. States that did not implement the waivers prior to August, 1996 were: D.C., Idaho, Kansas, Louisiana, Maine, South Carolina, and Tennessee. These states then either implemented them under the new Temporary Assistance to Needy Families (TANF) laws or rewrote them.

17. The maximum federal EITC credit in 2004 was 4,300. In Wisconsin, a refundable credit of 43% of the federal EITC is available for a family with three or more children, which would result in a possible maximum credit of $6,149.

18. All control variables that measure dollar amounts (EITC benefits, AFDC-FS benefits, annual income, state GDP, and state mean wage) are adjusted for inflation and are measured in 2004 dollars, though this is unimportant given the inclusion of year effects in the model.

19. Annual hours worked is calculated as the product of usual weekly hours worked and weeks worked last year.

20. Imputed nominal wages of less than $1 per hour were recoded at $1.00; imputed nominal wages greater than $100 per hour were recoded at $100. The results on the wage equations were not sensitive to modest changes in top or bottom coded values.

21. Elasticities are calculated via the ratio of the coefficient on the log minimum wage variable and the mean of the dependent variable (reported in Table 1). Results are not sensitive to the inclusion of higher-order polynomials.

22. These findings are robust to the inclusion or exclusion of state economic controls and state welfare policy variables.

23. If estimation results for more highly-educated single mothers had indicated significant effects of minimum wage increases, this would have undermined the credibility of results for less-educated single mothers by raising suspicions that the findings in columns (2) and (3) were spurious correlations.

24. The results using these measures are not sensitive to minor changes in the parameters on weeks and hours used to define steady and full-time employment.

25. These states include AK, AL, AR, CA, DC, DE, FL, GA, IL, KS, KY, LA, MA, MI, MO, MS, NC, NJ, NM, NY, OH, OK, PA, RI, SC, SD, TN, TX, WI, and WV.

State Minimum Wages from 1989 to 2004 that were Higher than the Federal Minimum on January 1

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Federal minimum	3.35	3.80	4.25	4.25	4.25	4.25	4.25	4.75	5.15	5.15	5.15	5.15	5.15	5.15	5.15	5.15
Northeast																
New England																
Maine	3.75	3.85	---	---	---	---	---	---	---	---	---	---	---	5.75	6.25	6.25
New Hampshire	3.65	3.75	3.85	---	---	---	---	---	---	---	---	---	---	---	---	---
Vermont	3.65	3.75	3.85	---	---	---	4.75	4.75	5.00	---	---	5.75	6.25	6.25	6.25	6.75
Massachusetts	3.75	3.75	---	---	---	---	---	---	5.25	---	---	6.00	6.75	6.75	6.75	6.75
Rhode Island	4.00	4.25	4.25	4.45	4.45	4.45	4.45	4.45	5.15	---	---	5.65	6.15	6.15	6.15	6.15
Connecticut	4.25	4.25	4.25	4.27	4.27	4.27	4.27	4.27	4.77	---	5.65	6.15	6.40	6.70	6.90	7.10
Middle Atlantic																
New Jersey	---	---	---	5.05	5.05	5.05	5.05	5.05	5.05	---	---	---	---	---	---	---
New York	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Pennsylvania	3.70	3.80	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Midwest																
East North Central																
Illinois	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	5.50
West North Central																
Minnesota	3.85	3.95	4.25	---	---	---	---	---	---	---	---	---	---	---	---	---
Iowa	---	3.85	4.25	4.65	4.65	4.65	4.65	4.65	---	---	---	---	---	---	---	---
South																
South Atlantic																
Delaware	---	---	---	---	---	---	---	4.65	5.00	---	---	5.65	6.15	6.15	6.15	6.15
District of Columbia	4.33	4.33	4.33	4.33	4.33	5.25	5.25	5.25	5.75	5.75	6.15	6.15	6.15	6.15	6.15	6.15
East South Central																
None	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
West South																
None	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
West																
Mountain																
None	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Pacific																
Washington	3.85	4.25	4.25	---	---	4.90	4.90	4.90	4.90	---	5.70	6.50	6.72	6.90	7.01	7.16
Oregon	---	4.25	4.75	4.75	4.75	4.75	4.75	4.75	5.50	6.00	6.50	6.50	6.50	6.50	6.90	7.05
California	4.25	4.25	4.25	---	---	---	---	---	---	5.00	5.75	5.75	6.25	6.75	6.75	6.75
Pacific (noncontiguous)																
Alaska	3.85	3.85	4.30	4.75	4.75	4.75	4.75	4.75	5.25	5.65	5.65	5.65	5.65	5.65	7.15	7.15
Hawaii	3.85	3.85	---	4.75	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.75	6.25	6.25

Source: Updated from Burkhauser et al. (2000), Fiscal Policies Institute (2004), and the U.S. Department of Labor.

In 1990 and 1991, the federal minimum wage was not implemented until April 1. Thus, some states listed in the table have a higher state minimum wage than the federal minimum wage from January to March in those years. In 1996 and 1997, the federal minimum wage was not implemented until October 1. Thus, some states listed in the table have a higher state minimum wage than the federal minimum wage from January to September in those years.

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